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For: ENDOVASCULAR TISSUE REMOVAL DEVICE

- 1        1. An endovascular tissue removal device comprising:
  - 2              a lumen including a rotatable terminal hub advanceable in vasculature;
  - 3              at least one fiber extending from the hub for ablating tissue; and
  - 4              an expandable mechanism connected to the fiber for biasing it into
  - 5              position for precisely ablating tissue as the hub rotates.
  
- 1        2. The device of claim 1 in which there are a plurality of fibers extending  
2              from the hub and connected to the expandable mechanism so that the plurality of fibers  
3              can be spread apart for tissue ablation and also collapsed together for vascular insertion  
4              and removal.
  
- 1        3. The device of claim 1 in which the expandable mechanism is a  
2              circumferentially expanding balloon.
  
- 1        4. The device of claim 3 in which there are two balloons, one inside and one  
2              outside of the distal end of the fiber.
  
- 1        5. The device of claim 3 in which the lumen includes an inflation conduit  
2              therein connected to the balloon.

1           6.     The device of claim 1 in which the fiber is an optical fiber connected to a  
2       source of laser energy.

1           7.     The device of claim 1 in which the fiber is a waveguide connected to a  
2       source of laser energy.

1           8.     The device of claim 1 further including a tissue trap device surrounding  
2       the expandable mechanism.

1           9.     The device of claim 1 in which the fiber includes an angled distal portion.

1           10.    The device of claim 1 further including a mirror for redirecting the  
2       ablation energy.

1           11.    The device of claim 1 further including an expandable mechanism  
2       inflatable on the ventricular side of the valve for supporting the leaflets of the valve.

1           12.    The device of claim 11 further including an absorptive surface on the  
2       expandable mechanism for absorbing ablation energy.

1           13.    The device of claim 11 in which the expandable mechanism is a balloon.

1           14. An endovascular tissue removal device comprising:

2                 a hub advanceable in vasculature;

3                 a plurality of fibers extending from the hub for ablating tissue; and

4                 an expandable mechanism connected to the plurality of fibers for

5                 spreading the fibers into position for resection and for collapsing the fibers together for

6                 vascular insertion and removal.

1           15. An endovascular tissue removal device comprising:

2                 a hub advanceable in vasculature;

3                 a plurality of fibers extending from the hub for ablating tissue; and

4                 an expandable balloon connected to the plurality of fibers for spreading the

5                 fibers into position for resection and for collapsing the fibers together for vascular

6                 insertion and removal.

1           16. An endovascular tissue removal device comprising:  
2                 a fiber advanceable within vasculature to ablate tissue;  
3                 an outer expandable balloon; and  
4                 an inner expandable balloon spaced from the outer expandable balloon  
5                 forming a space within which the fiber travels to resect tissue.

1           17. The endovascular tissue removal device of claim 16 in which the outer  
2                 expandable balloon is a portion of a tissue trap device.

1           18. The endovascular tissue removal device of claim 16 in which the distal  
2                 end of the fiber is angled.

1           19. The endovascular tissue removal device of claim 16 further including an  
2                 expandable mechanism inflatable on the ventricular side of the valve for supporting the  
3                 leaflets of the valve.

1           20. The endovascular tissue removal device of claim 19 further including an  
2                 absorptive surface on the expandable mechanism for absorbing ablation energy.

1           21. The endovascular tissue removal device of claim 19 in which the  
2                 expandable mechanism is a balloon.

1           22. A method of removing the aortic valve, the method comprising:

2                 introducing a lumen within the vasculature of a patient to a situs proximate

3                 a heart valve to be resected;

4                 introducing ablative energy into the lumen; and

5                 rotating the lumen to resect the heart valve.

1           23. An endovascular valve removal device comprising:

2                 a lumen including a rotatable terminal hub advanceable in vasculature;

3                 at least one fiber extending from the hub for ablating valve tissue;

4                 a first expandable mechanism connected to the fiber for biasing it into

5                 position for precisely ablating valve tissue as the hub rotates; and

6                 a second expandable mechanism inflatable on the ventricular side of the

7                 valve for supporting the valve leaflets during resection.